WHITE LAKE PRESERVATION PROJECT

REPORT

Water Quality Monitoring Program
2018

Summary Document

Looking South from Hardwood Island

INDEX

Water Quality Monitoring Program And Research Activities -2018

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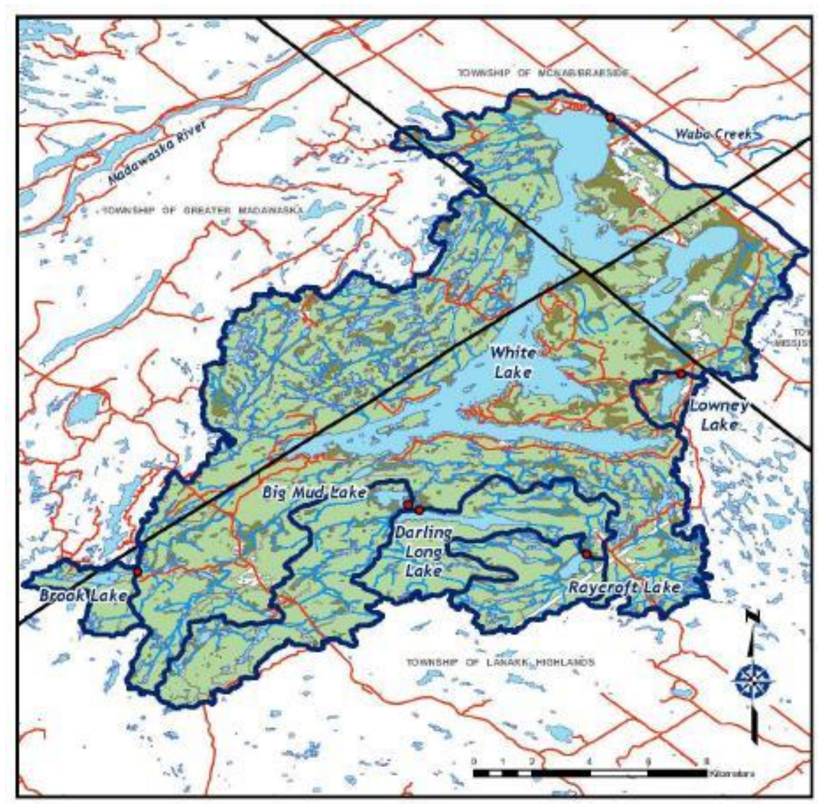
1. Introduction and Summary



Introduction: White Lake is characterized as a shallow warm water lake. The drainage basin (pictured in the map) is relatively small compared with the total area of the lake. The western part of the lake shore is comprised mainly of pre-Cambrian (acidic) rocks whereas the remainder of the shoreline and the rocks under the lake are calcium rich in nature (basic). It is the calcium rich rocks that give the lake its chemical signature with a basic pH and high calcium content. Both of these factors strongly favour the growth of zebra mussels, an invasive species which has now been observed in great numbers in all parts of White Lake since 2016.

An examination of the drainage basin map (above) in concert with topographical maps reveals that the parts of the lake located near the pre-Cambrian rocks are fed by surface and ground waters emerging from heavily forested and hilly terrain. The remainder of the lake, including areas starting at Hayes Bay and stretching through The Canal, the Narrows and finally the White Lake Village Basin is surrounded by deforested landscape including some farms.

The forested areas, which include numerous beaver dams and ponds, serve as a buffer storing much of the water falling as rain or melting from snow. Trees also have a

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significant uptake of water during the growing season. On the other hand, the remainder of the drainage basin comprises deforested landscape which offers little or no storage of water above the natural water table. In parts of the lake which are surrounded by dense forest, and which also contain the deepest waters, rain and runoff reach the lake at a slower pace relative to the deforested areas. As a consequence of this, the shallowest parts of the lake including parts of The Canal and areas leading to and including parts of the White Lake Village Basin receive rain and snow melt surface waters as well as ground water infiltration (up through the bottom of the lake) at a much higher rate especially after a weather event such as a heavy rain.

The quality of the water in White Lake is of great importance to anyone wishing to use the lake for recreational purposes and also for the maintenance of a healthy ecosystem including fisheries. The long-term monitoring of water quality will provide a record of how the lake is changing with time. The effects of climate change, increasing use by humans and the influence of invading species on White Lake need to be recorded so that we can take whatever actions are required to ensure the long-term health of the lake.

Many people ask us to describe the condition of White Lake in a word. They ask if it is in good condition or in only fair condition. Although it would be expedient to do so, these terms are subjective, have little meaning, and cannot be used to paint a complete picture which is in reality much more complex. Our objective is to collect valid data in a systematic and scientific manner, to interpret these data taking into consideration the significant body of knowledge available in the published scientific literature, and in turn inform you of changes taking place in White Lake over time. We publish all of our raw data and invite anyone to suggest alternate interpretations. This is how science works. The word '*Preservation*' looms large in our organizational name because one of our main objectives is to work to keep the lake from further degradation and if possible, improve its current condition.

In 2016, White Lake experienced an explosion in populations of zebra mussels, with numbers estimated to be up to one billion individuals. Zebra mussels have been found in every part of White Lake and are especially prevalent attached to aquatic plants. In 2018, the extent of the infestation continued to increase. It will likely take several more years before an equilibrium is reached and zebra mussels numbers become stable.

The most obvious effect of the presence of zebra mussels is the greatly increased clarity of the lake. Looking back at 2015 and years previous, such a finding would have been welcomed as an improvement in water quality. However, attendant effects of zebra mussels are serious and transformative. Zebra mussels are filter feeders and can lead to the wholesale (~90%) transfer of nutrients from lake waters to sediments, especially near the shoreline. White Lake is only 9.1 m deep at the deepest location and has an average depth of 3.0 m. Secchi depth readings which measure water clarity reached over 9 m in 2018. This means that virtually the entire floor of the lake is illuminated with sunlight during the ice-free season.

Since 2015, the concentration of measured total phosphorus in the lake has declined by at least 50%. Total phosphorus levels in 2018 did marginally increased from 2016 and 2017 levels, but not significantly so. The general reduction in total phosphorus levels in no way indicates that there was less phosphorus entering the lake. There is, in fact, no evidence of any changes in human activity or other factors which would result in lower total phosphorus levels in all parts of the lake other than those resulting from zebra mussels infesting the lake.

The final section of this document summarizes the influence of zebra mussels in transferring particulate phosphorus from the deeper parts of the lake to near shoreline environments while leaving behind that fraction of total phosphorus responsible for algae propagation. This means that we can no longer point to lower total phosphorus levels as a positive indicator of lake health.

In 2018 White Lake experienced at least 5 algal blooms. As predicted by the scientific literature, there were blooms of filamentous green algae. Also predicted was the occurrence of blooms of *microcystis aeruginosa* blue-green algae. Two blooms, one certified toxic and the other likely to have been also, were almost lake wide but concentrated on the north shore of Three Mile Bay. This part of White Lake has the most populated and altered shoreline of any on the lake. Only time will tell if these blooms reoccur every year.

We now know that White Lake is at capacity meaning that the lake cannot tolerate additional nutrient inputs such as phosphorus. We also know that the lake is experiencing annual green algal blooms and this year two extensive toxic blue-green algal blooms. These two issues taken together present us with our greatest challenge in preserving White Lake and should be the driving force motivating us to take action!

The effects of zebra mussels as well as climate change are only two of the multiple stressors affecting White Lake which, taken together, make the lake more susceptible to algal blooms and other undesirable consequences due to human activity. The results contained in this report highlight the importance that we, the caretakers of White Lake, do whatever we can to minimize our impact on White Lake ecosystems.

In the meantime, we have to become more vigilant and press our politicians to work with our lake associations and other interested parties to ensure that existing bylaws are used properly in planning decisions and enforced, and that we take measures to protect and preserve the lake. These measures could include septic inspections, shoreline rehabilitation, limits on boat sizes and the control of damaging wakes. There are many things we can do to mitigate the effects of other stressors we cannot control notably the care, restoration and preservation of the 15 metre 'ribbon of life' along the water's edge.

We should also become organized as a society to pro-actively work to prevent the infestation of White Lake with other invasive species some of which have effects far worse than zebra mussels. They are just around the corner!!

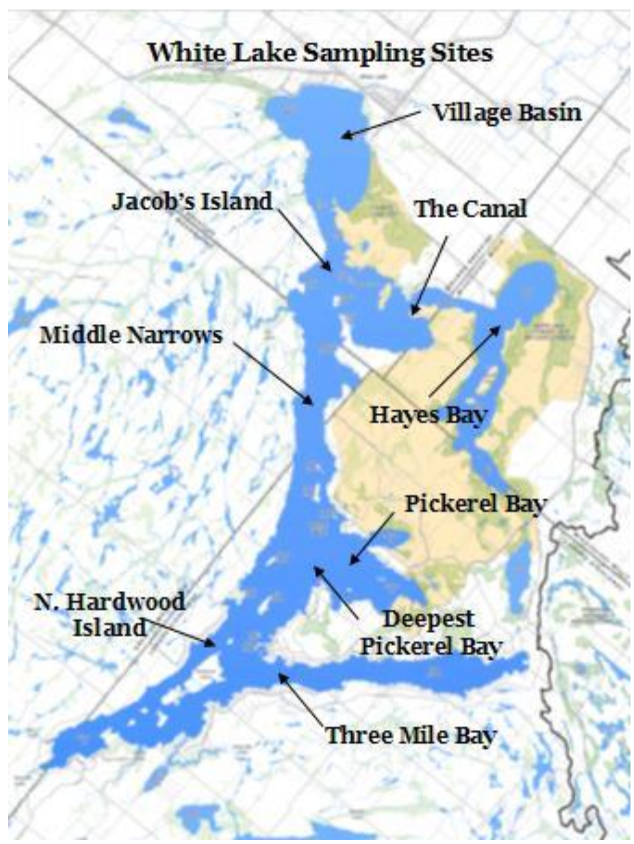
Other Research: In addition to water quality measurements, we have completed a number of research projects aimed at increasing our knowledge of White Lake allowing us to better characterize its nature and processes, such as water flow.

These studies include: 1) Annual Common Loon Survey; 2) Influence of stream waters on lake water quality; 3) The health of the pickerel fishery; 4) Tape Grass in White Lake; 5) The nature and extent of organic sediments and marl deposits in White Lake; 6) The distribution of wild rice in White Lake; 7) The continued propagation of zebra mussels in White Lake. Several other projects on lake biota are also reported on.

The Science Committee and the WLPP value your opinions and suggestions and welcome any comments or questions you may have concerning this report, its contents or any of our other activities. There is an anonymous suggestions box setup for your convenience on the WLPP website main page at: www.WLPP.ca or you may contact us directly at WLPPmail@gmail.com.

2. WLPP Water Quality Monitoring Program

The water quality monitoring program for 2018 consisted of two parts. The first part was carried out by WLPP volunteers and involved the collection of water samples mid-month for 6 months starting in May. Duplicate water samples were collected for phosphorus analysis and a single separate sample was collected for calcium, chloride, sulphate, potassium, magnesium, sodium, silica and dissolved organic carbon determinations. Water samples were filtered through an 80-micron mesh to remove any large biota such as daphnia which would skew analytical results. Note that the total phosphorus data obtained is for both phosphorus available as free phosphorus (there are several phases of phosphorus suspended and in solution) as well as phosphorous contained in small



phytoplankton[2] and zooplankton. Secchi depth readings as well as temperature at the Secchi depth were recorded at the same time. Additionally, Secchi depth, pH, conductivity and temperature readings were taken every two weeks during the summer season providing additional data for these parameters. We also completed extensive field studies of conductivity, temperature and pH for the five major stream water sources entering White Lake.

Throughout the summer we monitored biota populations in the lake and monitored the lake for algal blooms. We completed surveys of lake sediment types and mapped the location of marl deposits on the lake. A survey of wild rice occurrences was done and a map detailing the location of wild rice beds was produced.

All water samples for the determination of phosphorus content were shipped to the Dorset Environmental Science Centre (Ontario Ministry of the Environment Conservation and Parks) for analysis under the auspices of the Lake Partner Program. The method used for the determination of phosphorus is described in the publication: B.J. Clark et al, *Assessing variability in total phosphorus measurements in Ontario lakes*, Lake and Reservoir Management, 26:63-72, 2010. The limit of detection for phosphorus using this method is 0.2 parts per billion (ppb).

The second activity involved providing support and participating in research being completed by Carleton University. A graduate student is completing a paleolimnological study of sediments in White Lake. This work involves separating diatoms from sediment layers followed by identifying, classifying and counting them. In this way, the history of nutrient (such as phosphorus) input into White Lake can be reconstructed. A second component of this research involves collecting, identifying and counting the biota living in the lake as a function of depth.

The scientific literature reports that when a zebra mussel infestation occurs, phytoplankton populations in the water column can be reduced by more than 90%. Since White Lake is a relatively large but very shallow lake, the surface area on which zebra mussels can thrive is large when compared to the total volume of water contained in White Lake. For this reason, it is more likely that phytoplankton populations were almost totally removed as would not be the case for a much smaller and deeper lake.

The section on *Water Clarity* in the full version of this report shows that since the arrival of zebra mussels, the waters of White Lake have become clearer every year starting in 2015. This trend is expected to continue as the population of zebra mussels increases and eventually reaches equilibrium.

This year we experienced a total of five algal blooms, two of which were blue-green algae producing high levels of toxins (certified for one bloom, presumed for the second). All of

[2] [2]Phytoplankton are microscopic plants on which small animals (zooplankton) feed. Phytoplankton form the base of the food chain in a lake

these blooms are predicted to occur in the accepted scientific literature. The reasons for this are elaborated on in this report.

Action needs to be taken to re-establish disturbed shorelines, respect setbacks, enforce good and well-known environmental practices including septic system inspections. We also need to protect our shorelines from boat wakes which erode shorelines and disturb near-shore sediments.

The changing climate tending towards warmer and longer summers (and longer ice-free periods) means that everyone using the lake, be they cottagers, permanent residents, campers, or casual users need to increase vigilance and care to preserve and protect White Lake.

3. Algal Blooms – 2018

This year five algal blooms were recorded. Three of the blooms were from green algae and two were blue-green. The first blue-green algal bloom contained microcystin toxins at a concentration of 25 ppb. This concentration greatly exceeds the limit for drinking water (1.5 ppb) and also exceeds the limit of 20 ppb for recreational use. The second blue-green algal bloom was reported to the Ministry of the Environment but was not tested by the MOE since it is currently limiting each lake to one sampling per year. The collection and analysis of one sample costs nearly $1,000 and the MOE does not have the resources to follow up on every report. However, the bloom was registered at the Health Unit and classified as *Microcystis* blue-green algae based on photographs of the bloom and photomicrographs of the algae itself which we submitted to the MOE. It is very likely that the second bloom, which was as extensive as the first, was also laden with toxic microcystins. It is worth noting that our group has correctly identified the type and species of all algal blooms which have been documented since the WLPP was founded.

We emphasize that five algal blooms are the minimum number for White Lake, and there may very well have been others on the lake which went undetected or unreported. Currently only two volunteers are monitoring the 22 Km^2 of White Lake, which has a shoreline stretching nearly 100 km!

Green Algal Blooms

The first algal bloom of the season occurred on or about June 10, 2018. This bloom was found in a more remote part of White Lake but was very heavy and extensive in the area of Long Lake Creek East all the way from the creek itself to the point where it met the outflow or Darling Round Lake. This species of green algae is relatively simple to identify because as it dies and decomposes it floats to the surface to form large masses which are often referred to as ‘elephant snot’. It is also easy to identify under the microscope.

The second bloom occurred near Sunset Bay extending in patches for about 1 km from the boat launch. The bloom was most intense near the estuary of Boundary Creek. It was evident that wind and wave were in the process of dissipating the floating masses of algae when it was observed.

The third green algal bloom started in mid-August and continued until the end of September. This filamentous green algae (Sirogonium) grows in large patches along the shoreline. Nutrients (such as phosphorus) supporting this alga comes from both sediments in solid form and dissolved in lake water.

Viewed from underwater, the algae mass forms very large volumes extending from just below the surface of the lake all the way down to the lake floor. Other aquatic plants become enveloped within the growing mass. Over time, the algae die, collapses into itself and remains attached to standing aquatic plants resembling bright green garland.

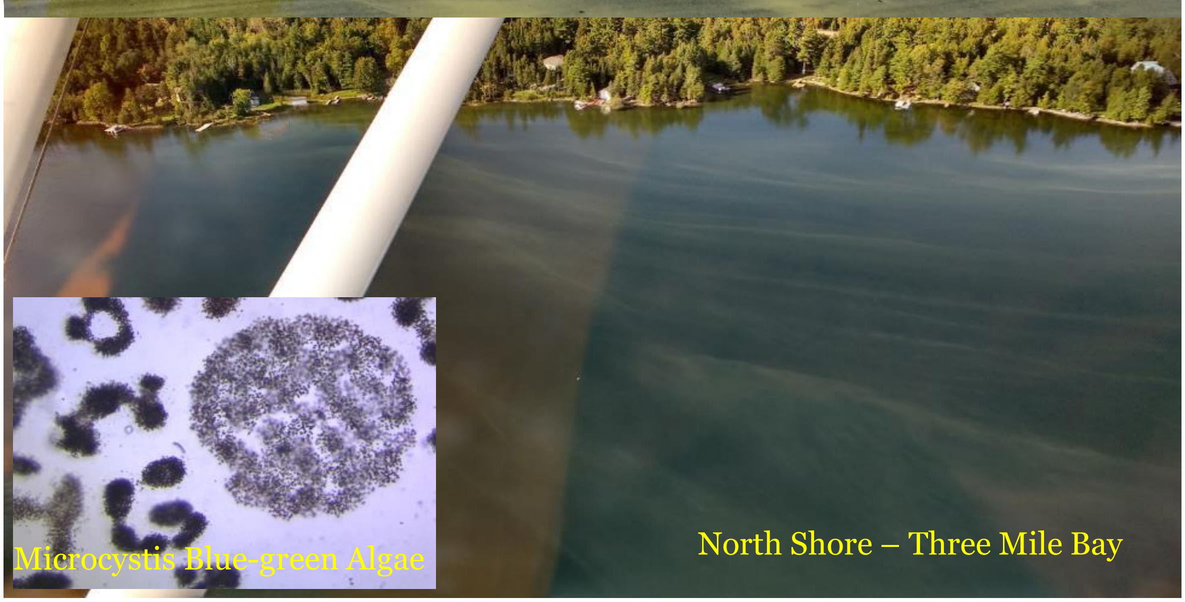
Blooms such as the one pictured above were common in 2018 all along the western shore of White Lake and also in other areas and along island shorelines. This bloom was essentially lake-wide and follows a similar bloom which occurred in 2017.

Blooms of filamentous green algae are a consequence of the presence of zebra mussels in White Lake. Zebra mussels concentrate nutrients from deeper parts of the lake and deposit them in shoreline areas where they thrive. Warmer daytime water temperatures, abundant light and nutrients, provide ideal conditions for the propagation of filamentous green algae along shorelines.

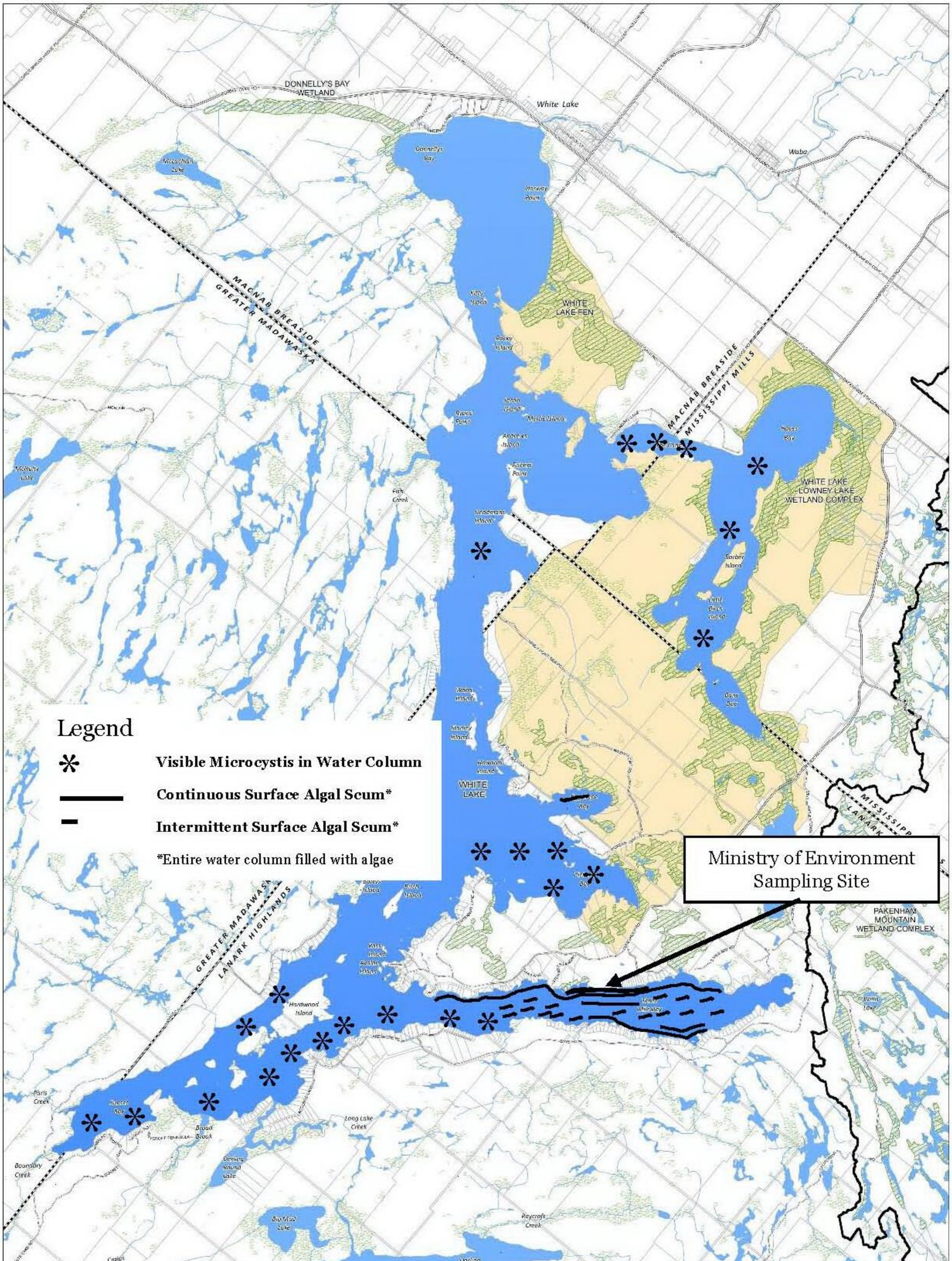
Blue-Green Algal Blooms

Blue-green algal blooms are not benign and so warrant special attention. When these blooms occur, they can create a public health hazard and anyone using the lake should be apprised of the seriousness of this issue. This year, White Lake hosted two blue-green algal blooms. It may be no coincidence that these blooms took place on the most altered shoreline on White Lake.

The first bloom was discovered on September 13, 2018. The photos below show the nature of the bloom and its appearance both close up and from above in a float plane.



Extent of September 13, 2018 Microcystis Blue Green Algal Bloom



The map above shows the extent and distribution of the September 13, 2018 *Microcystis* blue-green algal bloom. The algal bloom was most intense on the north shore of Three Mile Bay, but was present right across to the south side of the bay. In most of Three Mile Bay colonies of *Microcystis* were clearly visible from the surface of the lake all the way down to the lake bed.

In another part of the lake, a much smaller but similar bloom was present on the north shore of Thumbnail Bay. Elsewhere (*), smaller populations of *Microcystis* were observed, but these had not yet reproduced to the point of producing surface scum. The bloom lasted approximately 10 days at which point the algae had dissipated.

Note that monitoring the extent and longevity of an algal bloom requires much time and effort. Although we try to provide current up to date information, we would need more volunteer help to provide a complete picture of any algal bloom. For blue-green blooms, the Leeds, Grenville and Lanark District Health Unit provides a useful guide for individuals to use in assessing when water becomes safe to use after a toxic bloom is identified.

A second blue-green algal bloom was observed on October 10, 2018. Using microscopy, we identified this bloom as *Microcystis*. The occurrence of this bloom as well as photomicrographs of the algae were reported to the Ministry of the Environment. An incident number was assigned, but the MOE declined to return to White Lake for another round of sampling and analysis. Citing costs, the MOE informed us that they are limiting samplings to one per year per lake.

Although we have no data to show that the bloom was toxic, it is highly likely that it was considering that the nature of this bloom was the same as the September 13, 2018 bloom and occurred at the same location.

We know from samplings along the north shore of Three Mile Bay that this bloom was as extensive as the September 13, 2018 bloom.

This bloom persisted in the water column for several weeks after surface scum dissipated. Filtered water samples showed that even after three weeks *Microcystis* not only dominated the algae profile in lake water, it was in fact the only algae present! Note that zebra mussels promote the growth of *Microcystis* blue-green algae.

Algal Bloom Trends in Ontario

Climate change and other stressors have resulted in algal blooms to become more frequent, occur earlier in the year and persist for longer periods of time. This is a trend reported in the literature and on government web sites.

White Lake is now at capacity which means that any additional input of nutrients makes it more likely that algal blooms will occur. White Lake is a shallow warm water lake and thus is more vulnerable than most lakes in Ontario to both natural and man-made pressures. **We need to do our part in controlling and reducing our impact on White Lake**, especially when other stressors not under our control are intensifying.

In particular, maintaining a healthy shoreline, respecting setbacks for building projects, maintaining septic systems and reducing boat wakes and other disturbances to the shoreline and near-shoreline sediments. All of these actions will reduce the amount of nutrients entering the lake at the very locations where zebra mussels are active.

A recent article in *Cottage Life* magazine (September 21, 2018 issue) reported that Lake Muskoka in Ontario had experienced its sixth confirmed toxic algal bloom in 2018.

Although other lakes in addition to White Lake are now having more algal blooms, this is no reason for us to be complacent or to consider that this is 'normal' and should not be of concern.


Lake Muskoka, 2018

In the *Cottage Life* article cited above, it clearly states that "While blue-green algae blooms aren't new, they're becoming more frequent as cottage-country areas grow"

Cottage Life: "Cottagers can do their part by being mindful of their environmental impact. Maintaining a natural shoreline is one easy way to prevent excess nutrients from getting into your lake."

Algal Blooms on White Lake – Historical Data

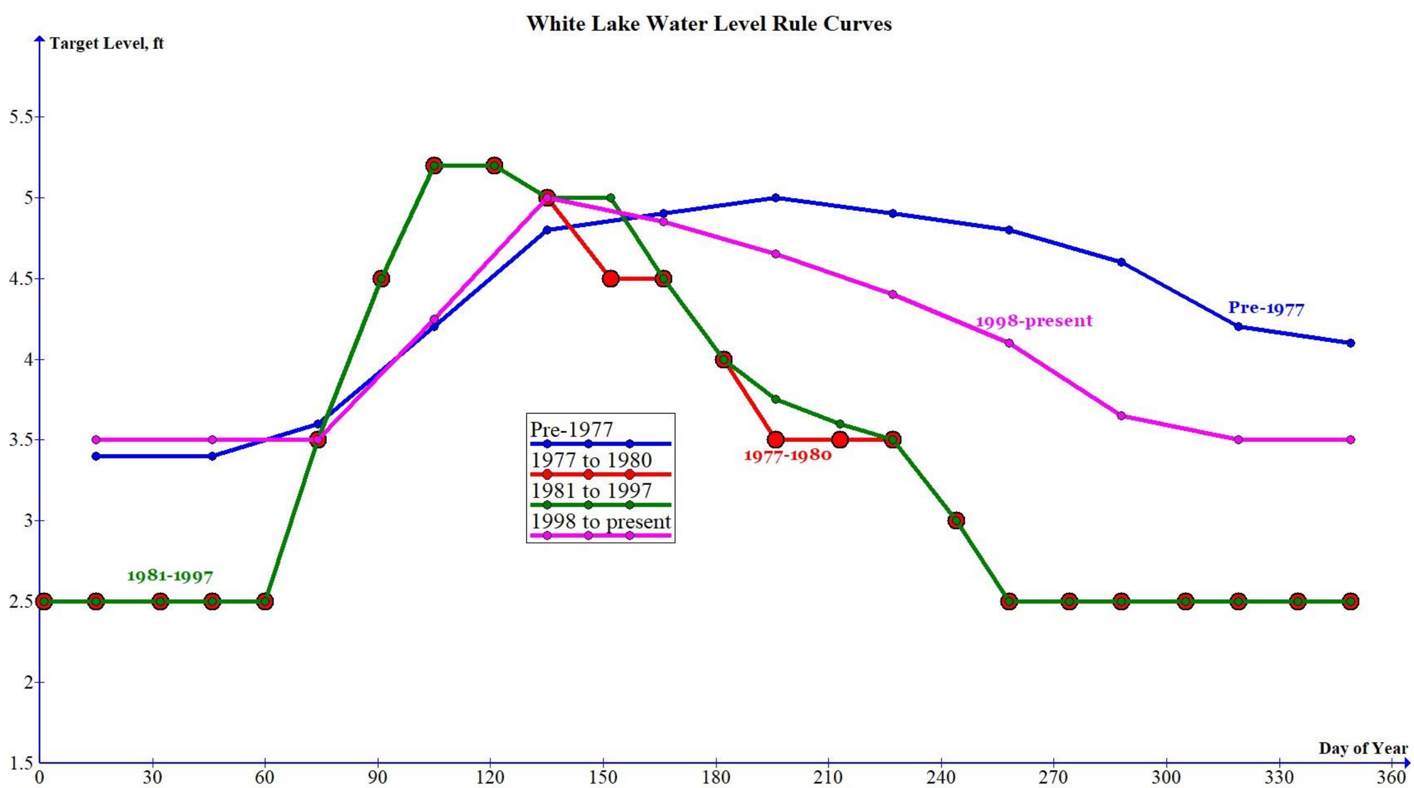
It has been brought up on several occasions at public forums that in the past there were regular lake-wide algal blooms. These comments may be valid, but should not be used to imply that algal blooms in White Lake defines its natural state, and so the more recent blooms are nothing to be concerned about.

These comments stem from written reports before and during the 1970s of regular algal blooms on White Lake. These blooms are reported in the literature and require a more rigorous analysis of facts when comparing them to more recent algal blooms.

There are several factors which at that time resulted in (likely green) algal blooms. These include:

1. Water Regime – water levels over the summer months
2. General use of phosphate detergents and related products
3. Poor performance of existing septic or other waste disposal systems

Below is a graph showing the varying water regimes which have been operative on White Lake:



The data used for the above graphs was taken from a paper written by H. von Rosen, Fisheries Management Officer, Carleton Place District, 1989.

The graph shows that up to 1977, water levels in White Lake were kept high (in order to satisfy the desire of the local population for boating purposes). In that report, von Rosen states that within two years of the initiation of this regime that *"midsummer algal blooms appeared, leaving green slime on the shores; rock rubble was covered with calcareous algae"*. Water levels in the lake essentially impeded the turnover of waters in the lake resulting in these algal blooms. Fish populations also suffered. He also states in his paper, that once a change in water regime is made, it takes approximately five years for the change to totally take effect. The current water level regime used is intermediate between very high and very low water levels perhaps giving us the most satisfactory results possible.

Interestingly, on page 10 of the report, von Rosen felt comfortable stating: *"In spite of attempts to explain the ecological reasons for the water regime public reaction to this water rule curve was best described as hostile"*.

During the 1970s, Canada went through the process of banning or reducing phosphates in detergents and other products. It is likely that the high-water level regime in place during the time when phosphates were permitted and used widely, also contributed to the production of algal blooms on White Lake. This source of phosphate is much reduced, although still present today.

In 1973, the White Lake Water Quality Committee conducted a massive sampling of White Lake waters for coliform bacteria. They collected and had analyzed 375 samples on three different occasions. The results of this study were released the same year.

When compared to coliform counts recorded in more recent times (WLPOA studies), the counts were significantly higher in the mid-1970s. This was likely due to the large number of septic or waste disposal systems which were underperforming relative to today's standards. This source of phosphorus would also have been a significant contributor to the algal blooms reported during this time period.

Today the nature and cause of algal blooms in White Lake are quite different as is discussed here and in other parts of the report. We will not elaborate on this further other than to say that outflow from septic systems, the change in phosphorus cycling by zebra mussels, climate change, year-round use of cottages as residences, increased boating effects, shoreline degradation, invasive species and exposed surface runoff should now be the subject of our attention

4. What White Lake is Telling Us and Why We Should be Listening

For the past 5 years the White Lake Preservation Project has been executing extensive and systematic studies of water quality. We have also worked on a number of projects designed to better describe White Lake and understand how water enters, moves around and leaves the lake during the year. Other work has given us insight into the nature and influence of waters entering the lake from streams as well as springs. We have also studied phytoplankton and zooplankton populations and how these have changed during this five-year period.

An important topic has been invasive species and the effects these have on the lake. In particular, the five-year study period we are reporting on straddles the infestation of White Lake with zebra mussels.

We have reported all of our work in a series of annual reports which have been bolstered by accompanying reports from the Mississippi Valley Conservation Authority and Watersheds Canada. Our writing has been enlightened and underpinned by an abundance of published scientific research papers, and all of our reports have been read and vetted by limnologists from government, universities, NGOs, conservation authorities and the private sector.

We now are able to see some trends in the data we collect and are in a position to offer the reader a synopsis of what we have learned and what we believe is in store for White Lake should we, as stewards of the lake, decide to adopt a wait and see attitude. Our long-term goal is to inform and to educate anyone interested in the health of White Lake and to motivate them to take the necessary action to ensure the survival of the lake into the future.

White Lake

White Lake is a shallow warm water lake. One of its distinguishing characteristics is that it is a wetlands lake surrounded in many places by marshlands. The average depth of White Lake is a mere 3 metres and the lake turns over less than once per year. This is a bit like flushing a toilet once per year! The implication is that nutrients and pollutants entering the lake essentially stay in the lake. Because the lake sits on top of limestone and is bordered on the south by calcium-containing rocks, the waters are an inviting habitat for zebra mussels, which have now found a permanent home in White Lake.

What About Total Phosphorus?

Recent research has made clear two vital facts related to total phosphorus:

- White Lake is at capacity and cannot handle more nutrient input.
- Zebra mussels have changed the way phosphorus is cycled in White Lake.

The consequences of both of these facts is that we now have or are likely to have more algal blooms; some of these will be toxic. This year, 2018, is a good example because White Lake experienced a minimum of 5 algal blooms, two of them toxic.

Total phosphorus levels are currently about half of what they were before zebra mussels arrived. What gives? Why are we still having algal blooms?

The answer lies in what algae eat and what zebra mussels eat.

Total phosphorus is the sum of a number of different phosphorus-containing components including plankton and other particulate matter plus phosphorus dissolved in water.

The diagram below shows the two categories of phosphorus which added together gives <u>total</u> phosphorus:

Total Phosphorus =	Plankton and particles containing phosphorus This fraction is about 50% of total phosphorus **This is what zebra mussels eat!**....about 90% of what is in the lake. Result: <u>Clear water!</u>	PLUS	Dissolved phosphorus from septic systems, shoreline runoff and sediments This fraction is about 50% of total phosphorus **This is what algae eat!** Result: <u>Algal Blooms!</u>

Zebra mussels effectively transfer most of the phosphorus in the blue box above to the shoreline where they live. This phosphorus would normally end up in sediments in the middle of the lake.

In the end, the amount of phosphorus available for algae to grow <u>HAS NOT CHANGED</u> even though the total phosphorus concentration we measure in water samples has been reduced by 50%!

What Happens to All of That New Phosphorus at the Shoreline?

Zebra mussels are filter feeders and they very efficiently filter out all of the particles containing phosphorus (green box above). They then excrete most of it to the sediments just below them.

The result of adding all of that extra nutrient load on the sediments is to encourage the growth of green algae such as the filamentous green algae which is now common. It also encourages the growth of blue-green algae, especially one called *Microcystis* which does form toxic algal blooms. We have had two such toxic blooms just this year.

Let's review how zebra mussels have changed White Lake:

Zebra mussels change the way phosphorus is cycled in the lake.

Zebra mussels transfer phosphorus from open lake water to near-shore waters and sediments.

Zebra mussels also change the composition and chemistry of near-shore sediments.

Zebra mussels do not remove the type of phosphorus responsible for algal blooms in the rest of the lake.

Zebra mussels promote growth of green and blue-green algae along shoreline.

Now, what does the scientific literature predict would happen to White Lake once zebra mussels arrived?

Published Literature Predicts	White Lake Observations
Marked decrease in total phosphorus levels	Decrease in TP by about 50%
Significant increase in water clarity	Water clarity more than doubled
Density and extent of aquatic plants along shoreline will increase	Marked increase in density of aquatic plants along shoreline
Shoreline water will become very clear especially in calm weather (no waves)	Where zebra mussels are present, water becomes crystal clear along shoreline
Microcystis blue-green algae favoured over *Anabaena* blue-green algae	2018 White Lake experiences first two recorded *Microcystis* algal bloom
Toxic algal blooms will occur at relatively low TP concentrations	2018 toxic (25 ppb toxins)* algal bloom in Sept. when TP was <10 ppb
Filamentous green algae will increase significantly	Filamentous green algae blooms are now common and extensive

*Drinking water limit: 1.5 ppb; Recreational limit: 20 ppb

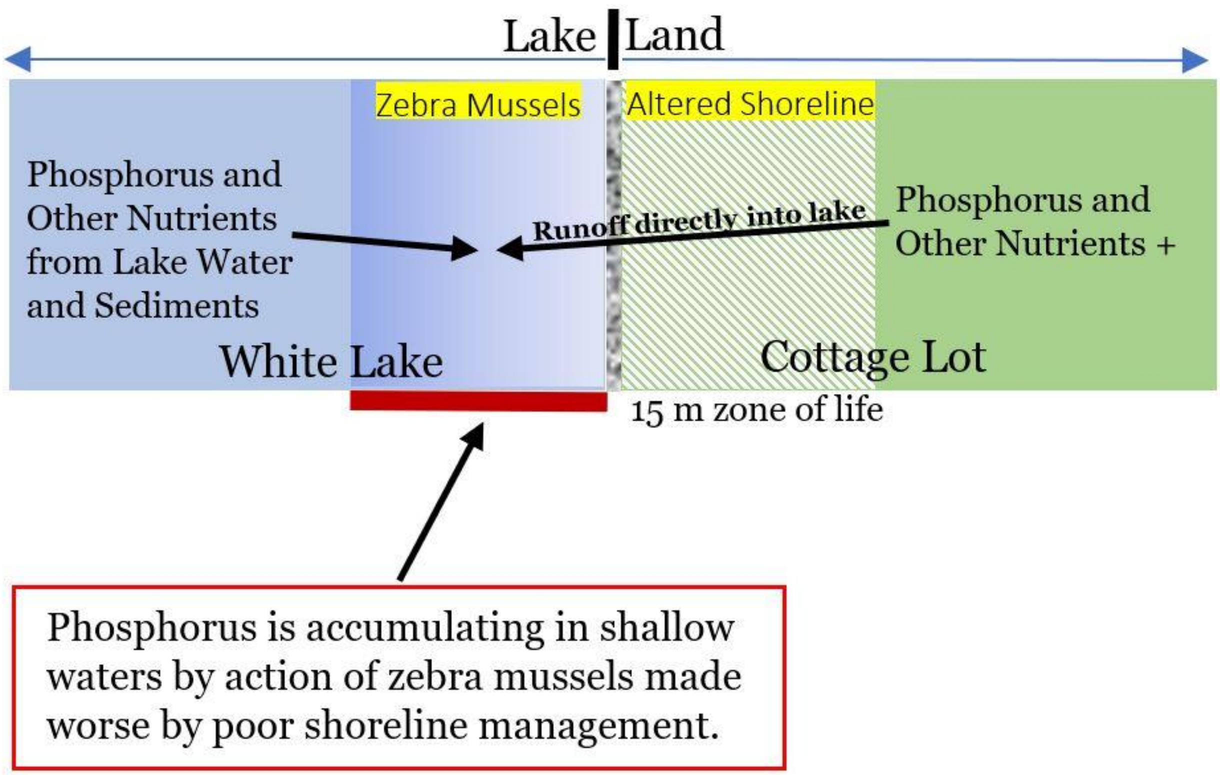
What is Happening Now to White Lake?

White Lake is currently under stress not only from the various pressures placed on it by human activities, but also by other factors including climate change and invasive species such as the zebra mussel. Some of these pressures are incremental like cottage conversions to permanent homes and some of these pressures are more dramatic as is the case of zebra mussels.

Below is a diagram which attempts to summarize the net effects of many of the factors discussed above. The blue square on the left represents White Lake and the lighter blue portion represents the near-shore environment where we generally have our docks, swim, fish, etc.

The green square on the right represents a typical cottage lot and the cross-hatched green portion the area of the shoreline sometimes referred to as the 15 metre zone of life.

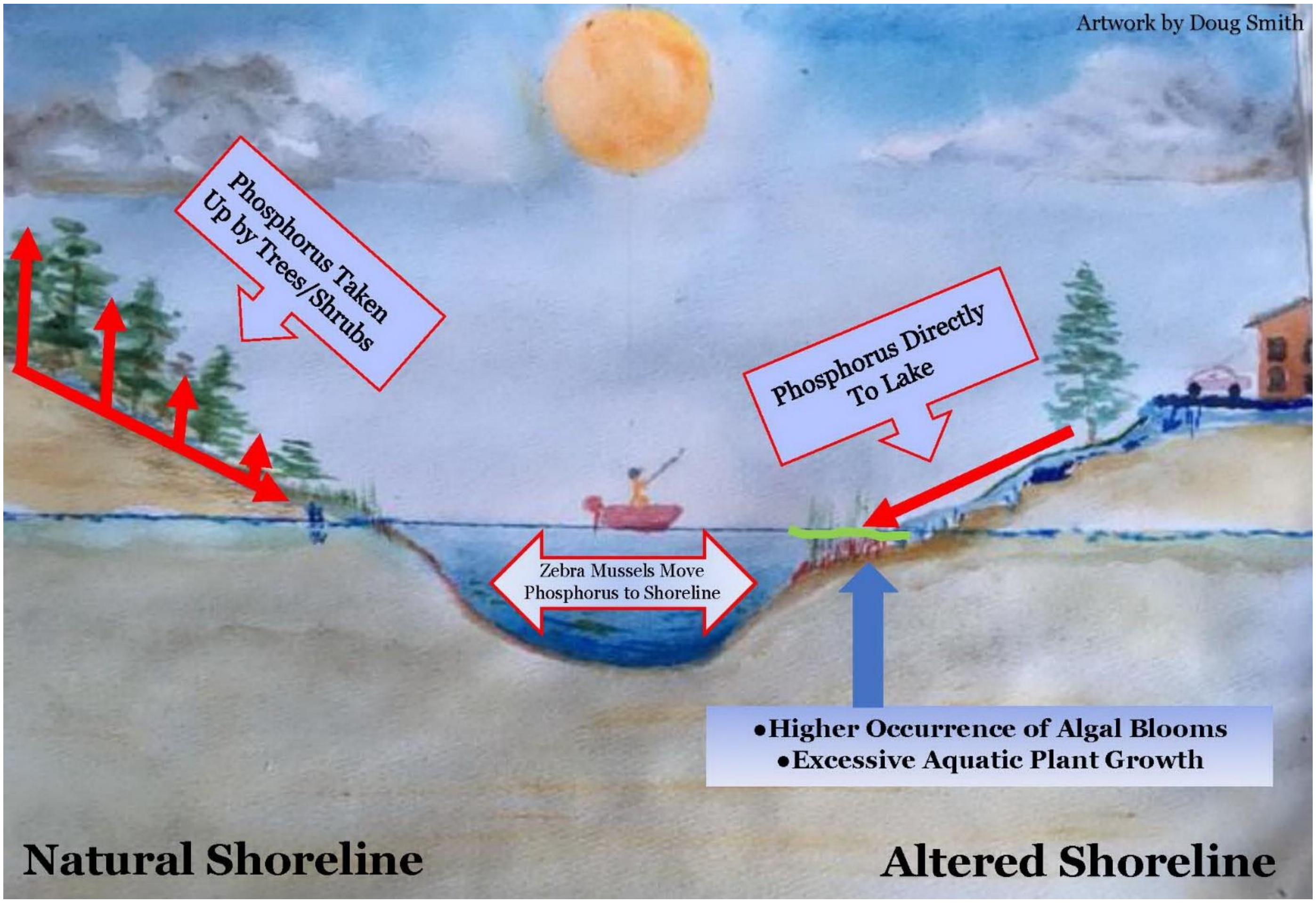
What the diagram shows is that one very important nutrient input to the near-shore environment that we can control is the maintenance of a healthy shoreline. Ignoring setbacks, clearing trees in favour of lawns, etc. all increase nutrient runoff into the lake.



What Do We Have to Lose?

This year we experienced two toxic blue-green algal blooms centered on altered shorelines. It is difficult to predict if we will have more next year or the year after that. What we do know is that as White Lake becomes more stressed, the probability of more blooms will increase.

The diagram below shows in a simplified way what happens when we alter a shoreline and interfere with nature's way of handling phosphorus and other nutrients. On the left we have a natural undisturbed shoreline showing phosphorus taken up by trees and other vegetation, preventing it from reaching the lake. On the right we have an altered shoreline providing no buffer for phosphorus and other nutrients allowing these to reach the lake unimpeded. The results are plain to see: more aquatic plants and algal blooms!



If we chose to ignore the signs, we could be headed for: 1) Higher frequency of algal blooms; 2) Earlier occurrence of algal blooms; 3) Greater extent of algal blooms; 4) Longer duration of algal blooms; 5) The release of massive quantities of phosphorus from lake sediments resulting in permanent algal blooms, loss of recreational use, lower property values and tax revenues.

The choice is ours to act and protect White Lake for ourselves and future generations.